

DEVELOPMENT OF PLANTATIONS ON CROWN LANDS

(Established 1981, Assessed 1986)



ABSTRACT

One hundred and twenty six permanent sample plots established in 1981 plantations were remeasured in 1986.

The sample covers three thousand hectares of Crown Land plantations of a total of eleven thousand four hundred and ninety (11,490) hectares planted.

Tables presented show height of planted trees, and the height and density of natural softwood and hardwood species.

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INTRODUCTION

Crown Land plantations have been monitored at 5 year intervals since 1980. Permanent sample plots were established in 1981 plantations during the summer of 1986. To date, seventeen hundred plots have been established across the Province.

The sample plots were remeasured at 5 year intervals to obtain data on plantation development and growth in support of the Crown Land timber supply projections.

The following report presents data from 126 permanent sample plots established in plantations of black spruce, white spruce, jack pine and larch.

All measurements were obtained by the Silviculture Section, Timber Management Branch, Department of Natural Resources and Energy, Province of New Brunswick.

METHODS

Permanent sample plots of 201 square metre area and 8.0 metre radius were established in Crown Land plantations in various locations across the province as suggested by Krause¹, (1979).

¹ H. H. Krause, 1979. Development and Yield Projections in Forest Plantations, A Proposal for Growth Monitoring in N.B. D.N.R. Plantations.

Plot locations were pre-recorded on aerial photographs and were changed only if specified plot criteria¹ could not be met. Each plot must contain a minimum of thirty one planted trees of a single species.

Planted trees within the sample plot were numbered, measured for height and tallied by species. Natural conifer reproduction within the 8 metre radius plots was also measured for height and recorded by species.

Hardwood competition was tallied on the 8 metre radius plot if fewer than 100 stems were present or on four one metre radius plots when more than one hundred stems were found. Hardwood species less than 50 centimetres high were not measured.

A soil pit was excavated near, but outside the 8 metre radius plot to provide an estimate of soil drainage. A visual determination of ground cover aids in classification of soil moisture regime. Slope (percent) and aspect (bearing) were recorded for each site.

A general damage assessment of planted trees within and surrounding each sample plot was conducted to determine damage intensity, distribution and cause.

RESULTS

The density of planted trees was not recorded at

¹ Instructions for Establishment of Sample Plots for Fifth Year Plantation Development Assessment - Department of Forest, Mines and Energy, 1985.

the 5th year measurement. This data is available from other sources¹.

The data presented in this report comes from the measurement of fully stocked (at least 31 trees per plot) sample plots established in 1986. These plots represent data for thirty (30) Crown Land plantations covering three thousand hectares (Tables 1 & 2).

Most plantations sampled meet the fifth year density criteria as defined in the "Timber Management Manual for Crown Lands 1984" (Table 5).

Fifth year height growth criteria was not achieved on the majority of the plantations (Table 5). Only one planted species, larch, meets fifth year height criteria (as defined in the Forest Management Manual) of 1.30 metres on a consistent basis. Sixty five percent of the sampled area planted to black spruce achieved minimum height criteria. Red pine plantations did not perform successfully (0 percent) in terms of height growth (Table 5).

The best height growth was recorded for larch on the Nepisiguit license. Black spruce reached its maximum height growth (1.28 metres) on the Queens-Charlotte license as did jack pine (1.80 metres) and white spruce (0.88 metres). None of the red pine plantations sampled achieved the minimum height growth criteria (Tables 3 & 5).

Although most plantations (93 percent) meet

¹First and Third Year Survival Reports, Dept. Natural Resources and Energy

acceptable species density standards, they were mainly overstocked when total density of all species was considered. Only twenty seven percent of the sampled area was within the specified softwood density range of 1 500 - 3 000 trees per hectare (Table 5).

As expected, larch plantations exhibited the largest average height growth (1.75 metres) over five years, followed by jack pine (1.56 metres), red pine (1.21 metres), black spruce (0.80 metres) and white spruce (0.60 metres) (Table 4).

Paper pot plantations grew at double the rate of bare root stock (Table 4).

Hardwood competition was present in most (90 percent) of the plantations sampled. The density of competing hardwoods ranged from zero (0) to thirty four thousand (34,000) trees per hectare (Tables 1 & 2).

Natural softwood density, when including balsam fir, was also excessive (more than 3000 trees per hectare) in many (53 percent) plantations. Densities ranged from fifty (50) to twenty one thousand (21 000) trees per hectare (Tables 1 & 2). Acceptable softwood densities were considerably lower and ranged from zero (0) to fourteen hundred (1 400) trees per hectare (Tables 1 & 2).

SUMMARY

Plantations established in 1981 and assessed in 1986 were well stocked but were generally slow growing and experiencing excessive competition from hardwoods and other softwood species.

TABLE 1
DEVELOPMENT OF SELECTED 1981
BARE ROOT PLANTATIONS ASSESSED 1986
5TH YEAR REPORT

SILVICULTURE TREATMENT NUMBER	PLANTATION NAME	AREA HA.	PLANTED SOFTWOOD AVG. HGT	ALL NATURAL SOFTWOOD		ACCEPTABLE ³ NATURAL SOFTWOOD		ALL NATURAL HARDWOOD		NATURAL HARDWOOD COMPETITION ⁴	
				AVG. DEN- SITY ¹	AVG. HGT. ²	AVG. DEN- SITY	AVG. HGT.	AVG. DEN- SITY	AVG. HGT.	AVG. DEN- SITY	AVG. HGT.
101001881BP1	Charlo (Old Dam)	102	0.53	3 618	0.95	25	0.82	0	0.00	0	0.00
307000181BP1	Union Sett.	58	0.50	6 416	0.85	1 219	1.19	1 318	1.59	771	2.17
307000181BP2	Union Sett.	32	0.44	1 815	1.26	174	1.65	2 263	1.96	1 592	2.34
406003881BP1	Little Lake Rd.	33	0.66	2 354	0.87	232	1.21	46 155	1.46	33 688	1.72
406004281BP1	Deer Lake	67	0.73	50	0.30	0	0.00	12 732	1.33	7 162	1.75
407003181BP1	Glencoe	15	1.14	2 959	1.06	99	1.21	9 151	1.29	2 785	1.82
408003081BP1	Tin Kettle Bk.	65	0.58	1 484	0.62	41	1.70	21 884	1.56	16 579	1.82
408003981BP1	Dineen Woods	11	0.41	597	1.46	0	0.00	11 937	1.42	8 754	1.66
408004081BP1	Browns Mtn.	43	0.41	1 069	1.33	0	0.00	12 061	1.63	10 867	1.67
409003281BP1	Cloverdale	18	1.28	4 078	1.03	199	1.07	8 356	1.39	2 387	2.62
409003381BP1	Cloverdale	71	0.62	391	1.33	7	1.69	12 619	1.62	7 730	2.12
510002381BP1	Head of Little Fork	96	0.67	547	1.14	0	0.00	1 790	1.53	1 243	1.87

1 DENSITY IN TREES PER HECTARE

2 HEIGHT IN METRES

3 ACCEPTABLE INCLUDES ALL SOFTWOOD SPECIES EXCEPT BALSAM FIR EQUAL TO OR TALLER THAN 0.75 METRES OR 1.30 METRES IF PINE OR LARCH SPECIES. ALSO REFERRED TO AS CRITICAL HEIGHT.

4 COMPETITION INCLUDES ALL HARDWOODS EQUAL TO OR TALLER THAN ACCEPTABLE SOFTWOOD CRITICAL HEIGHT.

TABLE 2
DEVELOPMENT OF SELECTED 1981
PAPER POT PLANTATIONS ASSESSED 1986
5TH YEAR REPORT

SILVICULTURE TREATMENT NUMBER	PLANTATION NAME	AREA HA.	PLANTED SOFTWOOD AVG. HGT	ALL NATURAL SOFTWOOD		ACCEPTABLE ³ NATURAL SOFTWOOD		ALL NATURAL HARDWOOD		NATURAL HARDWOOD COMPETITION ⁴	
				AVG. DEN- SITY ¹	AVG. HGT. ²	AVG. DEN- SITY	AVG. HGT.	AVG. DEN- SITY	AVG. HGT.	AVG. DEN- SITY	AVG. HGT.
101T03681BP1	Cook Savole	70	1.22	5 085	1.30	1 194	1.55	10 072	1.30	5 471	2.08
101T03981BP1	Akroyd Lake	26	0.53	3 506	0.88	970	1.62	1 766	0.67	0	0.00
102T01681BP1	Rio Road	62	0.56	668	0.83	14	1.08	8 057	1.22	5 656	1.53
102T04481BP1	Wildcat Road	12	1.21	647	0.43	0	0.00	4 029	0.93	597	1.93
102T04681BP1	Wildcat Road	102	2.01	1 206	0.60	6	0.75	29 941	1.19	2 487	2.22
204T12581BP1	Bayles Lake	520	1.40	14 583	1.22	169	1.24	3 173	0.79	0	0.00
204T12581BP2	Bayles Lake	520	1.28	3 631	1.42	796	1.67	613	0.76	17	1.70
204T12681BP1	Bayles Lake	197	0.93	21 275	1.15	124	0.93	3 649	1.19	2 667	1.52
406T10681BP1	Deer Lake	162	1.28	566	1.13	435	1.14	12 614	0.89	1 846	1.54
406T11081BP1	S. Oromocto Lake	40	0.88	1 475	1.02	1 111	1.01	7 444	1.02	4 559	1.25
406T11881BP1	Big Kedron Lake	209	1.80	3 680	0.84	1 428	1.03	18 971	1.31	3 226	1.85
408T04881BP1	Oromocto Lake	83	1.00	1 970	1.29	716	1.44	39 789	1.41	22 282	1.74
408T05481BP1	Dinnen Road	49	0.48	3 064	1.06	169	1.08	9 072	1.28	6 366	1.54
408T05581BP1	Browns Mountain	19	0.35	1 169	1.73	0	0.00	16 711	1.73	13 528	1.97
408T10381BP1	Four Mile	84	1.79	622	0.60	50	0.82	7 796	1.05	553	2.23
409T09881BP1	Teague Brook	79	0.67	9 077	1.24	1 131	1.31	448	0.78	50	1.12
409T10581BP1	Cloverdale	93	1.32	3 896	1.28	414	1.60	17 507	1.07	2 653	2.23
510T05281BP1	Cedar Brook	80	0.72	99	0.73	0	0.00	199	1.28	199	1.28

1 DENSITY IN TREES PER HECTARE

2 HEIGHT IN METRES

3 ACCEPTABLE INCLUDES ALL SOFTWOOD SPECIES EXCEPT BALSAM FIR EQUAL TO OR TALLER THAN 0.75 METRES OR 1.30 METRES IF PINE OR LARCH SPECIES. ALSO REFERRED TO AS CRITICAL HEIGHT.

4 COMPETITION INCLUDES ALL HARDWOODS EQUAL TO OR TALLER THAN ACCEPTABLE SOFTWOOD CRITICAL HEIGHT.

TABLE 3
SPECIES DEVELOPMENT OF SELECTED 1981
PLANTATIONS ASSESSED IN 1986
5TH YEAR REPORT

SILVICULTURE TREATMENT NUMBER	AREA HA.	PLANTED SOFTWOOD			METHOD OF SITE PREPARATION
		SPECIES	STOCK TYPE	HEIGHT(M)	
101001881BP1	102	wS	BR	0.53	Shark Fin Barrels
101T03681BP1	70	jP	PP	1.22	Shark Fin Barrels
101T03981BP1	26	bS	PP	0.33	Burn & Anchor Chains
102T01681BP1	62	bS	PP	0.56	C & H Plow
102T04481BP1	12	jP	PP	1.21	Burn & Disc Trencher
102T04681BP1	102	tL	PP	2.01	Burn & Disc Trencher
204T12581BP1	520	jP	PP	1.40	Finnish Plow
204T12581BP2	520	jP	PP	1.28	Finnish Plow
204T12681BP1	197	bS	PP	0.93	Finnish Plow
307000181BP1	58	wS	BR	0.50	Finnish Plow
307000181BP1	32	wS	BR	0.44	Finnish Plow
406003881BP1	33	wS	BR	0.66	C & H Plow
406004281BP1	67	wS	BR	0.73	Shark Fin Barrels
406T10681BP1	162	bS	PP	1.28	Shark Fin Barrels
406T11081BP1	40	wS	PP	0.88	Shark Fin Barrels
406T11881BP1	209	jP	PP	1.80	Shark Fin Barrels
407003181BP1	15	rP	BR	1.14	C & H Plow
408003081BP1	65	wS	BR	0.58	C & H Plow
408003981BP1	11	wS	BR	0.41	C & H Plow
408004081BP1	43	wS	BR	0.41	C & H Plow
408T04881BP1	83	bS	PP	1.00	C & H Plow
408T04381BP1	49	bS	PP	0.48	C & H Plow
408T04481BP1	19	bS	PP	0.35	C & H Plow
408T10381BP1	84	jP	PP	1.79	Burn & Shark Fin Barrels
409003281BP1	18	rP	BR	1.28	C & H Plow
409003381BP1	71	wS	BR	0.62	C & H Plow
409T09881BP1	79	wS	PP	0.67	C & H Plow
409T10581BP1	93	tL	PP	1.32	C & H Plow
510002381BP1	96	wS	BR	0.67	C & H Plow
510T05281BP1	80	bS	PP	0.72	Bracke

wS - white spruce, bS - black spruce, jP - jack pine, rP - red pine
BR - bare root, PP - paper pot

TABLE 4
LICENSE AVERAGES OF SELECTED 1981 PLANTATIONS
FIVE YEARS AFTER PLANTING

LICENSE	STOCK TYPE	PLANTED SOFTWOOD HGT. (M)	BLACK SPRUCE HGT. (M)	WHITE SPRUCE HGT. (M)	JACK PINE HGT. (M)	RED PINE HGT. (M)	LARCH HGT. (M)
UPSALQUITCH	BR	0.53	-	0.53	-	-	-
	PP	0.94	0.33	-	1.22	-	-
	ALL	0.80	0.33	0.53	1.22	-	-
NEPISIGUIT	PP	1.33	0.56	-	1.21	-	2.01
	ALL	1.33	0.56	-	1.21	-	2.01
UPPER MIRAMICHI	PP	1.14	0.93	-	1.35	-	-
	ALL	1.14	0.93	-	1.35	-	-
QUEEN'S CHARLOTTE	BR	0.68	-	0.68	-	-	-
	PP	1.42	1.28	0.88	1.80	-	-
	ALL	1.29	1.28	0.77	1.80	-	-
FUNDY	BR	0.73	-	0.47	-	1.14	-
	ALL	0.73	-	0.47	-	1.14	-
YORK	BR	0.51	-	0.51	-	-	-
	PP	1.23	0.71	-	1.79	-	-
	ALL	1.00	0.71	0.51	1.79	-	-
CARLETON	BR	0.76	-	0.62	-	1.28	-
	PP	1.03	-	0.67	-	-	1.32
	ALL	0.89	-	0.64	-	1.28	1.32
RESTIGOUICHE - TOBIQUE	BR	0.67	-	0.67	-	-	-
	PP	0.72	0.72	-	-	-	-
	ALL	0.72	0.72	0.67	-	-	-
PROVINCE	BR	0.65	-	0.56	-	1.21	-
	PP	1.18	0.80	0.75	1.56	-	1.75
	ALL	1.04	0.80	0.60	1.56	1.21	1.75

BR - bare root, PP - paper pot

TABLE 5
SPECIES PERFORMANCE
FIVE YEARS AFTER PLANTING

SPECIES	ASSESSED AREA (ha)	HEIGHT PERFORMANCE*	DENSITY PERFORMANCE**
Black Spruce	678	65	100 (48)***
White Spruce	697	40	100 (41)
Jack Pine	1 415	57	85 (7)
Red Pine	33	0	100 (0)
Larch	195	100	100 (52)
All Species	3 108	49	93 (27)

* Percent of area attaining minimum height standards.

** Percent of area attaining minimum and maximum density standards.

Planted density assumed to be 1 650 trees per hectare.

*** Bracketed figures include all softwood species.